

Patent Claims

1. Modular transmission unit (1), in particular a multistage transmission (2)
 - 1.1 with a box input (E) and a box output (A);
 - 1.2 with two superimposed gears (9, 10) designed as three-shaft planetary wheels (11, 12), each comprising a sun wheel (25, 27), a hollow wheel (24, 28), a spacer (23, 26) and planetary wheels, whereby each of the individual shafts are formed by the sun wheels (25, 27), hollow wheels (24, 28), spacers (23, 26) or the elements connected in a torque-proof manner with them;
 - 1.3 a first shaft (13) of the first superimposed gear (9) is connected in a torque-proof manner with the box input (E);
 - 1.4 a second shaft (14) of the first superimposed gear (9) and a second shaft (17) of the second superimposed gear (10) can at least be connected indirectly with the box output (A);
 - 1.5 a continuously variable transmission (5) in the form of a traction mechanism box (6) is arranged between the third shafts (15, 18) of the first and second superimposed gears (9, 10);
 - 1.6 with means for controlling the gear transmission ratio at the traction mechanism box (6);
- characterized by the following characteristics:
- 1.7 each of the couplings between the individual superimposed gears (9, 10) and the continuously variable transmission (5) takes place through a linking gear (39, 40), comprising a transmission stage (19, 20);
 - 1.8 the first shaft (16) of the second superimposed gear (10) can be connected optionally with the box input (E) via a first clutch coupling (21);
 - 1.9 the second shaft (14) of the first superimposed gear (9) and the third shaft (18) of the second superimposed gear (10) can be connection optionally with the box output (A) via at least one other second clutch coupling (22).

2. Modular transmission unit (1) in accordance with claim 1, characterized in that the second shaft (14) of the first superimposed gear (9) is connected in a torque-proof manner with the third shaft (18) of the second superimposed gear (10).
3. Modular transmission unit (1) in accordance with one of claims 1 or 2, characterized in that the individual linking gear (19, 20) is formed by a reverse gear.
4. Modular transmission unit (1) in accordance with claim 3, characterized in that the individual linking gear (19, 20) is formed by a spur-wheel stage (36), comprising an even number of intermeshing spur wheels (29, 30, 37, 38).
5. Modular transmission unit (1) in accordance with claim 4, characterized in that one of the intermeshing spur wheels (29, 30, 37, 38) of the individual linking gears (19, 20) are formed by the third shaft (15) if the first superimposed gear (9) and/or the third shaft (18) of the second superimposed gear (10) or form one structural unit with them.
6. Modular transmission unit (1) in accordance one of claims 1 through 5, characterized in that the sun wheel (27) of the second superimposed gear (10) is created depending on the overall transmission ratio spread to be achieved.
7. Modular transmission unit (1) in accordance with one of claims 1 through 6, characterized in that the first superimposed gear (9) is designed with the transmission of the continuously variable transmission (5), which corresponds with the theoretical maximum permissible gear transmission ratio at the continuously variable transmission.
8. Modular transmission unit (1) in accordance with one of claims 1 through 7, characterized in that, with respect to its sizing, the sun wheel (25) of the first superimposed gear (9) is

characterized by a pitch circle diameter that is in the range of 2 to 2.6 times smaller than that of the hollow wheel (24) of the first superimposed gear (9).

9. Modular transmission unit (1) in accordance with one of claims 1 through 8, characterized in that, with respect to its sizing, the sun wheel (27) of the second superimposed gear (10) is characterized by a pitch circle diameter that is in the range of 2 to 2.6 times smaller than that of the hollow wheel (24).
10. Modular transmission unit (1) in accordance with one of claims 1 through 9, characterized by the following characteristics:
 - 10.1 the first shaft (13) of the first superimposed gear (9) and the first shaft (16) of the second superimposed gear (10) are each formed by the spacer (23) of the first planetary wheel (11) or the spacer (26) of the second planetary wheel (12) or elements coupled with them in a torque-proof manner;
 - 10.2 the second shaft (14) of the first superimposed gear (9) is formed by the sun wheel (25) of the first planetary gear (11) and the second shaft (17) of the second superimposed gear (10) is formed by the hollow wheel (28) of the second planetary wheel (12);
 - 10.3 the third shaft (15) of the first superimposed gear (9) is formed by the hollow wheel (24) of the first planetary wheel (11) and the third shaft (18) of the second planetary wheel (12) is formed by the sun wheel (27) or an element coupled with it in a torque-proof manner.
11. Modular transmission unit (1) in accordance with claim 10, characterized in that the sun wheel (25) of the first planetary gear (11) and the sun wheel (27) of the second planetary gear (12) are connected with each other in a torque-proof manner via a hollow shaft.
12. Modular transmission unit (1) in accordance with claim 11, characterized in that the coupling between the box input (E) and the first shaft (16) of the second superimposed

gear (10) takes place via a shaft connected in a torque-proof manner with the spacer (23) of the first planetary wheel (11) and guided through the hollow shaft.

13. Modular transmission unit (1) in accordance with one of claims 10 through 12, characterized by the following characteristics:
 - 13.1 the first spur wheel of the first linking gear is formed by the hollow wheel (24) of the first superimposed gear (9);
 - 13.2 the second linking gear (20) is formed by a spur wheel (3) couple in a torque-proof manner with the third shaft (18) designed as a hollow shaft and another spur wheel (37), which is connected in a torque-proof manner with the continuously variable transmission (5).
14. Modular transmission unit (1) in accordance with one of claims 1 through 13, characterized in that the continuously variable transmission (5) is designed as a force-fit traction mechanism box (6) and the traction mechanism (34) is formed by a belt or a chain.
15. Modular transmission unit (1) in accordance with one of claims 1 through 14, characterized in that means for the non-slip coupling of the traction mechanism (34) to the revolution speed of the box input (E) are provided.
16. Modular transmission unit (1) in accordance with claim 15, characterized in that the means for equalizing the velocity of circulation of the traction mechanism (34) to the revolution speed of the box input (E) comprise a transfer element (42) that can be coupled at least indirectly with the box input (E) and connected in a force-fitting manner with the traction mechanism (34).
17. Modular transmission unit (1) in accordance with claim 16, characterized in that the traction mechanism (34) has a circumferential profile (44) on its outer perimeter (43), which can be attached with a complementarily designed profile (45) on the outer perimeter (46) of the transfer element (42).

18. Modular transmission unit (1) in accordance with claim 17, characterized in that the transfer element (42) is arranged coaxially to the box input shaft (E) or parallel to it and, for the retention of the tension in the traction mechanism (34), a pivot gear (48) is provided for the pivoting of the disk arrangements (33, 35) of the continuously variable transmission (5) and the transfer element (42).
19. Modular transmission unit (1) in accordance with claim 18, characterized in that the transfer element (42) is arranged coaxially to and in a torque-proof manner with the box input shaft (E) or parallel to it and a movable or pivotable tensioning device (47) is assigned to the traction mechanism (34) for the retention of the tension.
20. Modular transmission unit (1) in accordance with one of claims 1 through 19, characterized in that the means for controlling the gear transmission ratio on the traction mechanism box (6) comprise actuating elements for adjusting the distances between the individual disk arrangements (33, 35).
21. Modular transmission unit (1) in accordance with one of claims 1 through 20, characterized in that, between the third shaft of the first superimposed gear (9) and the third shaft (18) of the second superimposed gear (10), a transmission of 1 to 2 through 3, preferably 1 to 2.5 can be set, or the transmission can be set between the two individual disk arrangements at a ratio of 1 to 2 through 3.
22. Modular transmission unit (1) in accordance with one of claims 1 through 21, characterized in that the input (E) is connected with a switchable starter unit (48).
23. Modular transmission unit (1) in accordance with one of claims 1 through 22, characterized in that means for reversing the direction of rotation are also provided.

24. Modular transmission unit (1) in accordance with claim 23, characterized in that the means comprise a reverse gear.
25. Modular transmission unit (1) in accordance with one of claims 1 through 24, characterized in that the first and/or the second clutch couplings (21, 22) are designed as frictionally engaged or synchronous clutch couplings.
26. Modular transmission unit (1) in accordance with one of claims 1 through 25, characterized in that a starter element (48) is switched into the box input (E).
27. Modular transmission unit (1) in accordance with claim 26, characterized in that the starter element (48) is designed as a hydrodynamic rpm/torque converter or hydrodynamic clutch.
28. Modular transmission unit (1) in accordance with claim 27, characterized in that a bridge clutch is assigned to the starter element (48).
29. Modular transmission unit (1) in accordance with claim 28, characterized in that the starter element (48) is designed as a multiple-disk clutch.